DISCUSSION OF THE AMENDMENTS

Claim 4 is currently amended.

Claim 5 is cancelled without prejudice or disclaimer.

Claims 6 and 7 were previously presented.

Upon entry of the amendments claims 4, 6 and 7 will be active.

The amendment to claim 4 is supported on page 4, lines 4 and 5, page 5, lines 30-36, page 7, lines 29-31 and page 9, lines 34-36 of the specification.

No new matter has been added.

REMARKS

The Office rejected claims 4-7 under 35 U.S.C. §103(a) over Adams (U.S. Patent No. 3,161,670). Applicants submit that Adams does not teach or suggest all the recitations of the claimed process, and therefore, the claims would not have been rendered unpatentable under 35 U.S.C. §103(a) over Adams.

The disclosed process involves

A) providing a feed gas stream a comprising n-butane;

B) feeding the feed gas stream a comprising n-butane and an oxygeneous gas as co-feed into at least one first dehydrogenation zone and nonoxidatively catalytically autothermally dehydrogenating n-butane in the presence of a dehydrogenation catalyst comprising platinum or palladium or both platinum and palladium to obtain a product gas stream b comprising n-butane, 1-butene, 2-butene, butadiene, hydrogen, low-boiling secondary constituents and optionally steam;

C) feeding the product gas stream b of the nonoxidative catalytic dehydrogenation and an oxygenous gas into at least one second dehydrogenation zone and oxidatively dehydrogenating 1-butene and 2-butene in the presence of an oxydehydrogenation catalyst based on a multimetal oxide comprising Mo and Bi to obtain a product gas stream c comprising n-butane, 2-butene, butadiene, hydrogen, low-boiling secondary constituents and steam, said product gas stream c having a higher content of butadiene than the product gas stream b;

D) removing hydrogen, the low-boiling secondary constituents and steam to obtain a C_4 product gas stream d substantially consisting of n-butane, 2-butene and butadiene;

E) feeding the C_4 product gas stream d into a distillation zone and removing a butadiene/butane mixture as the product of value stream e1, to leave a stream e2 consisting substantially of n-butane and 2-butene;

F) recycling the stream e2 into the first dehydrogenation zone.

Adams describes a process for preparing olefinic compounds. In the process, a gas stream is first heated in a preheater then passed to a first dehydrogenation reaction zone in the absence of oxygen followed by dehydrogenation in a second reaction zone in the presence of oxygen. The reaction product is then sent to a separation zone where product is isolated from unreacted gas. The unreacted gas is the sent back to the first reaction zone. For butane, Adams isolates butadiene product and then sends unreacted butane and "butylenes" back to the first reaction zone. (See column 5, lines 36-38).

First Applicants point out that Adams does not conduct the first nonoxidative dehydrogenation step autothermally. Adams preheats the gas rather than conducting an autothermal process. Applicants note that an autothermal process is achieved by obtaining heat from the added oxygen and hydrogen formed during dehydrogenation. Adams avoids this autothermal process whereas the claimed process utilizes it. Accordingly, the Adams process can not be autothermal, and therefore, this feature of the claimed process distinguishes over Adams. Applicants note that non-oxidative dehydrogenation reactions can be run with oxygen present. Therefore, in contrast to Adams the first non-oxidative dehydrogenation step is run with oxygen present. The added oxygen reacts with generated hydrogen to form heat giving the autothermal process.

Further, the terms non-oxidative and oxidative refer to the dehydrogenation reactions not the hydrogen/oxygen reaction providing the autothermal heat. In non-oxidative dehydrogenation hydrogen gas is formed by elimination of H_2 from the hydrocarbon. In oxidative dehydrogenation free hydrogen is not formed in substantial amounts. In oxidative dehydrogenation hydrogen atoms are removed from the hydrocarbon with oxygen.

In addition, Adams does not teach or suggest steps C), D), E) and F) of the claimed process. As noted above, for butane Adams simply recycles unreacted butane and butylenes (1-butene and 2-butene). In contrast, the claimed process generates an n-butane and 2-butene gas stream for recycling back to the first reaction zone. Adams does not teach or suggest these steps. Because Adams does not teach or suggest all the recitations of the claimed process, the claimed process would not have been obvious over Adams. Accordingly, Applicants respectfully request that the Office withdraw the rejection of claims 4, 6, and 7 under 35 U.S.C. §103(a) over Adams.

The Office provisionally rejected claims 4-7 on the ground of nonstatutory obviousness-type double patenting over claims 6-11 of Application No. 10/584,758; over claims 5-10 of Application No. 10/584,783 and over claims 7-18 of Application No. 11/718,814. Applicants respectfully request that the Office hold these rejections in abeyance since the claims in these applications are not yet patented. The claims in these applications will be addressed in due course.

The Office also rejected claims 4-7 on the ground of nonstatutory obviousness-type double patenting over claims 1-4 of U.S. Patent No. 7,034,195.

Applicants submit that claims 1-4 of U.S. Patent No. 7,034,195 ('195) do not contain all the recitations of claims 4-7 of the present application. Specifically, the claims in '195 do not recite steps B), C), D), E) and F) in claim 4 of the present application. More specifically, the claims in '195 do not teach or suggest a palladium or platinum catalyst nor does '195 teach or suggest isolation of a n-butane and 2-butene gas stream for recycling into the first dehydrogenation zone which results from steps C), D) and E) of the claimed process.

Because the claims in '195 do not teach or suggest all the recitations of the claimed method, the claimed method, would not have been obvious over the claims in '195. Accordingly, Applicants respectfully request that the Office withdraw the rejection of claims 4-7 on the ground of nonstatutory obviousness-type double patenting over claims 1-4 of U.S. Patent No. 7,034,195.

Applicants also note that the Abstract and claim 4 have been amended such that they are free of the criticisms outlined on page 2 of the Office Action.

Finally, Applicants note that claim 7 does not contain the term "the noncatalytic dehydrogenation" and that the terms in claim 7 have antecedent basis.

In view of the above remarks, Applicant believes the pending application is in condition for allowance. Favorable reconsideration is respectfully requested.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 13156-00059-US from which the undersigned is authorized to draw.

Dated: March 31, 2008

Respectfully submitted,
Electronic signature: /Donald K. Drummond, Ph.D./
Donald K. Drummond, Ph.D.
Registration No.: 52,834
CONNOLLY BOVE LODGE & HUTZ LLP
1875 Eye Street, NW
Suite 1100
Washington, DC 20006
(202) 331-7111
(202) 293-6229 (Fax)
Attorney for Applicant